

Recovery Plan Action Status

Plan Name: San Marcos & Comal Springs & Associated Aquatic Ecosystems (Revised) Recovery Plan

Plan Status: Final Revision 1

Plan Date: 14-Feb-96

Lead Agency: USFWS

Lead Office: Austin Ecological Services Field Office

(490-0057)

Species	Action Priority #	Action #	Action Description	Action Status	Est. Initiation Date	Est. Completion Date	Responsible Parties	Work Type	Labor Type	Action Comments
Comal Springs riffle beetle (<i>Heterelmis comalensis</i>), San Marcos gambusia (<i>Gambusia georgei</i>), Fountain darter (<i>Etheostoma fonticola</i>), Texas wild-rice (<i>Zizania texana</i>), Texas blind salamander (<i>Typhlomolge rathbuni</i>), San Marcos salamander (<i>Eurycea nana</i>)	2	1	Spring Lake Aquatic Ecosystem Restoration	Ongoing Current	FY 2010	FY 2011	Other Federal Agencies	Management: Habitat Maintenance and Manipulation, Management: Land Use	Contract, Internal Administrative, Internal Technical Assistance	U.S. Army Corps of Engineers is moving forward with technical planning for removing structures in Spring Lake and improving habitats in the immediate vicinity of Spring Lake (removing buildings and parking lots and establishing a short-grass prairie)
Comal Springs riffle beetle (<i>Heterelmis comalensis</i>), San Marcos gambusia (<i>Gambusia georgei</i>), Peck's cave amphipod (<i>Stygobromus</i> (= <i>Stygionectes</i>) <i>pecki</i>), Fountain darter (<i>Etheostoma fonticola</i>), Comal Springs dryopid beetle (<i>Stygoparnus comalensis</i>), Texas wild-rice (<i>Zizania texana</i>), Texas blind salamander (<i>Typhlomolge rathbuni</i>), San Marcos salamander (<i>Eurycea nana</i>)	2	1.11	Determine food habits	Ongoing Current	FY 2007		Others, San Marcos National Fish Hatchery and Technology Center, Ecological Services	Research: Habitat Requirements	Graduate Student	

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Comal Springs riffle beetle (<i>Heterelmis comalensis</i>), San Marcos gambusia (<i>Gambusia georgei</i>), Peck's cave amphipod (<i>Stygobromus</i> (=Stygonectes) pecki), Fountain darter (<i>Etheostoma fonticola</i>), Comal Springs dryopid beetle (<i>Stygoparnus comalensis</i>), Texas wild-rice (<i>Zizania texana</i>), Texas blind salamander (<i>Typhlomolge rathbuni</i>), San Marcos salamander (<i>Eurycea nana</i>)	2	1.13	Determine reproductive parameters	Ongoing Current	FY 1995 - FY 1999		Texas Parks and Wildlife Department, Southwest Texas State University , San Marcos National Fish Hatchery and Technology Center, Ecological Services	Research: Propagation	Graduate Student	Supports priority one task 2.7.

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Comal Springs riffle beetle (<i>Heterelmis comalensis</i>), San Marcos gambusia (<i>Gambusia georgei</i>), Peck's cave amphipod (<i>Stygobromus</i> (=Stygonectes) pecki), Fountain darter (<i>Etheostoma fonticola</i>), Comal Springs dryopid beetle (<i>Stygoparnus comalensis</i>), Texas wild-rice (<i>Zizania texana</i>), Texas blind salamander (<i>Typhlomolge rathbuni</i>), San Marcos salamander (<i>Eurycea nana</i>)	1	1.15	Identify habitat characteristics and requirements	Ongoing Current	Prior to FY 1995		Texas Parks and Wildlife Department, Ecological Services	Research: Habitat Requirements, Research: Population Surveys	Contract, Graduate Student, Internal Administrative, Internal Field Assistance, Internal Technical Assistance, Volunteer	Supports priority one sub-task 2.11 in part.

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Comal Springs riffle beetle (<i>Heterelmis comalensis</i>), San Marcos gambusia (<i>Gambusia georgei</i>), Fountain darter (<i>Etheostoma fonticola</i>), Texas wild-rice (<i>Zizania texana</i>), Texas blind salamander (<i>Typhlomolge rathbuni</i>), San Marcos salamander (<i>Eurycea nana</i>)	2	1.22	Compile information on the characteristics of the San Marcos watershed	Not Started			U.S. Geological Survey, U.S. Environmental Protection Agency, Texas Parks and Wildlife Department, Soil Conservation Service , City of San Marcos, Ecological Services	Work type not yet selected	Labor type not yet selected	TPWD has compiled a great deal of useful information already.
Comal Springs riffle beetle (<i>Heterelmis comalensis</i>), Peck's cave amphipod (<i>Stygobromus</i> (=Stygonectes) pecki), Fountain darter (<i>Etheostoma fonticola</i>), Comal Springs dryopid beetle (<i>Stygoparnus comalensis</i>)	2	1.23	Compile information on the characteristics of the Comal watershed	Not Started			U.S. Geological Survey, U.S. Environmental Protection Agency, Texas Parks and Wildlife Department, City of New Braunfels (including New Braunfels Utilities, in some cases) , Soil Conservation Service , Ecological Services	Work type not yet selected	Labor type not yet selected	

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Comal Springs riffle beetle (<i>Heterelmis comalensis</i>), San Marcos gambusia (<i>Gambusia georgei</i>), Peck's cave amphipod (<i>Stygobromus</i> (=Stygonectes) pecki), Fountain darter (<i>Etheostoma fonticola</i>), Comal Springs dryopid beetle (<i>Stygoparnus comalensis</i>), Texas wild-rice (<i>Zizania texana</i>), Texas blind salamander (<i>Typhlomolge rathbuni</i>), San Marcos salamander (<i>Eurycea nana</i>)	1	1.25	Identify and determine effects of pollutants from point source discharges and other discharges on listed species and their habitats	Ongoing Current	FY 2010	FY 2012	Southwest Texas State University	Research: Environmental Contaminants	Graduate Student	Supports priority one task 2.8. -some costs covered in EPA permits - includes stormwater, utility, and commercial discharge; San Marcos River Observing System under Prof. Thom Hardy initiated a watershed study using HSPF and other models to estimate nutrient and contaminant runoff to San Marcos River; expected to run two years. SWTSU is now Texas State University - San Marcos;

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Comal Springs riffle beetle (<i>Heterelmis comalensis</i>), Peck's cave amphipod (<i>Stygobromus</i> (=Stygonectes) pecki), Fountain darter (<i>Etheostoma fonticola</i>), Comal Springs dryopid beetle (<i>Stygoparnus comalensis</i>)	1	1.27	Assess water quality in the Comal aquatic ecosystem and determine possible sources of negative impacts	Not Started			U.S. Geological Survey, U.S. Environmental Protection Agency, Texas Parks and Wildlife Department, Edwards Underground Water District , Texas Natural Resource Conservation Commission , Ecological Services	Research	Labor type not yet selected	Supports priority one task 2.8. - USGS has supported one year of study - contributes to management plan (2.42).
Comal Springs riffle beetle (<i>Heterelmis comalensis</i>), San Marcos gambusia (<i>Gambusia georgei</i>), Peck's cave amphipod (<i>Stygobromus</i> (=Stygonectes) pecki), Fountain darter (<i>Etheostoma fonticola</i>), Comal Springs dryopid beetle (<i>Stygoparnus comalensis</i>), Texas wild-rice (<i>Zizania texana</i>), Texas blind salamander (<i>Typhlomolge rathbuni</i>), San Marcos salamander (<i>Eurycea nana</i>)	1	1.28	Assess adequacy of existing aquifer water quality protection provisions	Not Started			U.S. Environmental Protection Agency, Texas Parks and Wildlife Department, Edwards Underground Water District , Water Management , Texas Natural Resource Conservation Commission , Others, Ecological Services	Research	Labor type not yet selected	Supports priority one task 2.5. - contributes to mgt. plan (sub-task 2.11).

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Comal Springs riffle beetle (<i>Heterelmis comalensis</i>), San Marcos gambusia (<i>Gambusia georgei</i>), Peck's cave amphipod (<i>Stygobromus</i> (=Stygonectes) pecki), Fountain darter (<i>Etheostoma fonticola</i>), Comal Springs dryopid beetle (<i>Stygoparnus comalensis</i>), Texas wild-rice (<i>Zizania texana</i>), Texas blind salamander (<i>Typhlomolge rathbuni</i>), San Marcos salamander (<i>Eurycea nana</i>)	2	1.3	Determine aquifer characteristics and recharge patterns and zones, etc.	Not Started			U.S. Geological Survey, Edwards Underground Water District , Water Management , Texas Natural Resource Conservation Commission	Work type not yet selected	Labor type not yet selected	Contributes to management plan sub-task 2.11. -this task may involve other responsible parties.

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Comal Springs riffle beetle (<i>Heterelmis comalensis</i>), San Marcos gambusia (<i>Gambusia georgei</i>), Peck's cave amphipod (<i>Stygobromus</i> (=Stygonectes) pecki), Fountain darter (<i>Etheostoma fonticola</i>), Comal Springs dryopid beetle (<i>Stygoparnus comalensis</i>), Texas wild-rice (<i>Zizania texana</i>), Texas blind salamander (<i>Typhlomolge rathbuni</i>), San Marcos salamander (<i>Eurycea nana</i>)	2	2.10	Control and/or remove select non-native organisms, etc.	Ongoing Current	FY 1995 - FY 1999		Texas Parks and Wildlife Department, Animal Damage Control (USDA) , City of New Braunfels (including New Braunfels Utilities, in some cases) , City of San Marcos, Ecological Services	Management: Predator and Competitor Control	Contract	Dependent on results of task 1.29.

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Comal Springs riffle beetle (<i>Heterelmis comalensis</i>), San Marcos gambusia (<i>Gambusia georgei</i>), Peck's cave amphipod (<i>Stygobromus</i> (=Stygonectes) pecki), Fountain darter (<i>Etheostoma fonticola</i>), Comal Springs dryopid beetle (<i>Stygoparnus comalensis</i>), Texas wild-rice (<i>Zizania texana</i>), Texas blind salamander (<i>Typhlomolge rathbuni</i>), San Marcos salamander (<i>Eurycea nana</i>)	1	2.12 (sub-task)	Provide Service guidance and support for the regional aquifer management planning effort	Ongoing Current	FY 2006		Ecological Services	Management: Habitat Maintenance and Manipulation, Management: Planning, Other: Regulations	Internal Administrative, Internal Technical Assistance	Supports priority one sub-task 2.11.

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Comal Springs riffle beetle (<i>Heterelmis comalensis</i>), San Marcos gambusia (<i>Gambusia georgei</i>), Peck's cave amphipod (<i>Stygobromus</i> (= <i>Stygonectes</i>) <i>pecki</i>), Fountain darter (<i>Etheostoma fonticola</i>), Comal Springs dryopid beetle (<i>Stygoparnus comalensis</i>), Texas wild-rice (<i>Zizania texana</i>), Texas blind salamander (<i>Typhlomolge rathbuni</i>), San Marcos salamander (<i>Eurycea nana</i>)	1	2.31	Continue to support proactive Federal agency conservation actions	Ongoing Current	FY 1995 - FY 1999		Other Federal Agencies, Ecological Services	Other: Regulations	Internal Field Assistance, Internal Technical Assistance	Supports priority one sub-task 2.11. From base costs in part.

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Comal Springs riffle beetle (<i>Heterelmis comalensis</i>), San Marcos gambusia (<i>Gambusia georgei</i>), Peck's cave amphipod (<i>Stygobromus</i> (= <i>Stygonectes</i>) <i>pecki</i>), Fountain darter (<i>Etheostoma fonticola</i>), Comal Springs dryopid beetle (<i>Stygoparnus comalensis</i>), Texas wild-rice (<i>Zizania texana</i>), Texas blind salamander (<i>Typhlomolge rathbuni</i>), San Marcos salamander (<i>Eurycea nana</i>)	1	2.33	Aggressively pursue Federal agency compliance with obligations for informal and formal consultations etc.	Ongoing Not Current	FY 1995 - FY 1999		Ecological Services	Other: Regulations	Internal Administrative	Supports priority one sub-task 2.11 from base costs in part.

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Comal Springs riffle beetle (<i>Heterelmis comalensis</i>), San Marcos gambusia (<i>Gambusia georgei</i>), Fountain darter (<i>Etheostoma fonticola</i>), Texas wild-rice (<i>Zizania texana</i>), Texas blind salamander (<i>Typhlomolge rathbuni</i>), San Marcos salamander (<i>Eurycea nana</i>)	1	2.41	Develop and implement management plan(s) for the San Marcos system	Not Started			Texas Parks and Wildlife Department, San Marcos River Foundation , Southwest Texas State University , City of San Marcos, Ecological Services, OTHER LANDOWNERS	Work type not yet selected	Labor type not yet selected	
Comal Springs riffle beetle (<i>Heterelmis comalensis</i>), Peck's cave amphipod (<i>Stygobromus</i> (= <i>Stygonectes</i>) <i>pecki</i>), Fountain darter (<i>Etheostoma fonticola</i>), Comal Springs dryopid beetle (<i>Stygoparnus comalensis</i>)	1	2.42	Develop and implement management plan(s) for the Comal River system	Not Started			Guadalupe Blanco River Authority , Lower Colorado River Authority , City of New Braunfels (including New Braunfels Utilities, in some cases) , National Fish and Wildlife Foundation , Texas Nature Conservancy , Ecological Services, OTHER LANDOWNERS	Work type not yet selected	Labor type not yet selected	Landowners include Comal Co. Rec. District No. 1, Schlitterbahn, and others.

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Comal Springs riffle beetle (<i>Heterelmis comalensis</i>), San Marcos gambusia (<i>Gambusia georgei</i>), Peck's cave amphipod (<i>Stygobromus</i> (=Stygonectes) pecki), Fountain darter (<i>Etheostoma fonticola</i>), Comal Springs dryopid beetle (<i>Stygoparnus comalensis</i>), Texas wild-rice (<i>Zizania texana</i>), Texas blind salamander (<i>Typhlomolge rathbuni</i>), San Marcos salamander (<i>Eurycea nana</i>)	2	2.6	Encourage management of spring, lake, river, and cave habitats by private individuals and others	Not Started			Texas Parks and Wildlife Department, Lower Colorado River Authority , City of New Braunfels (including New Braunfels Utilities, in some cases) , San Marcos River Foundation , Texas Natural Resource Conservation Commission , City of San Marcos, Ecological Services, Other Nongovernmental Organizations	Work type not yet selected	Labor type not yet selected	Costs reflect initial development costs. Activities would then be incorporated in basic program services.

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Comal Springs riffle beetle (<i>Heterelmis comalensis</i>), San Marcos gambusia (<i>Gambusia georgei</i>), Peck's cave amphipod (<i>Stygobromus</i> (=Stygonectes) pecki), Fountain darter (<i>Etheostoma fonticola</i>), Comal Springs dryopid beetle (<i>Stygoparnus comalensis</i>), Texas wild-rice (<i>Zizania texana</i>), Texas blind salamander (<i>Typhlomolge rathbuni</i>), San Marcos salamander (<i>Eurycea nana</i>)	1	2.7	Establish and maintain captive stocks	Ongoing Current	FY 1995 - FY 1999		Texas Parks and Wildlife Department, City of San Antonio , Southwest Texas State University , Dallas Aquarium , Others, San Marcos National Fish Hatchery and Technology Center, Ecological Services	Management: Propagation	Internal Administrative, Internal Field Assistance, Internal Technical Assistance	Dependent on results of task 1.4 in part.
Comal Springs riffle beetle (<i>Heterelmis comalensis</i>), San Marcos gambusia (<i>Gambusia georgei</i>), Peck's cave amphipod (<i>Stygobromus</i> (=Stygonectes) pecki), Fountain darter (<i>Etheostoma fonticola</i>), Comal Springs dryopid beetle (<i>Stygoparnus comalensis</i>), Texas wild-rice (<i>Zizania texana</i>), Texas blind salamander (<i>Typhlomolge rathbuni</i>), San Marcos salamander (<i>Eurycea nana</i>)	1	2.8	Reduce pollution loadings to San Marcos and Comal aquatic habitats and caves with Texas blind salamanders	Not Started			U.S. Environmental Protection Agency, City of New Braunfels (including New Braunfels Utilities, in some cases) , Texas Natural Resource Conservation Commission , Landowners , City of San Marcos, San Marcos National Fish Hatchery and Technology Center, Ecological Services	Work type not yet selected	Labor type not yet selected	Costs dependent on conclusions of tasks 1.22, 1.23, 1.24, 1.25, 1.26, 1.27, & 1.28

Species	Action Priority #	Action #	Action Description	Action Status	Est. Initiation Date	Est. Completion Date	Responsible Parties	Work Type	Labor Type	Action Comments
Comal Springs riffle beetle (<i>Heterelmis comalensis</i>), San Marcos gambusia (<i>Gambusia georgei</i>), Peck's cave amphipod (<i>Stygobromus</i> (=Stygonectes) pecki), Fountain darter (<i>Etheostoma fonticola</i>), Comal Springs dryopid beetle (<i>Stygoparnus comalensis</i>), Texas wild-rice (<i>Zizania texana</i>), Texas blind salamander (<i>Typhlomolge rathbuni</i>), San Marcos salamander (<i>Eurycea nana</i>)	3	2.9	Restore damaged habitats and enhance marginal habitats	Ongoing Current	FY 2000 - FY 2004		Texas Parks and Wildlife Department, City of New Braunfels (including New Braunfels Utilities, in some cases) , City of San Marcos, Ecological Services, Other Nongovernmental Organizations	Management: Habitat Maintenance and Manipulation	Contract, Internal Technical Assistance	Dependent on priority projects currently unidentified or scheduled.
Comal Springs riffle beetle (<i>Heterelmis comalensis</i>), San Marcos gambusia (<i>Gambusia georgei</i>), Peck's cave amphipod (<i>Stygobromus</i> (=Stygonectes) pecki), Fountain darter (<i>Etheostoma fonticola</i>), Comal Springs dryopid beetle (<i>Stygoparnus comalensis</i>), Texas wild-rice (<i>Zizania texana</i>), Texas blind salamander (<i>Typhlomolge rathbuni</i>), San Marcos salamander (<i>Eurycea nana</i>)	1	3.1	Monitor populations and habitats	Ongoing Current	FY 1995 - FY 1999		Texas Parks and Wildlife Department, San Marcos National Fish Hatchery and Technology Center, Ecological Services	Research: Population Surveys	Internal Administrative, Internal Field Assistance, Internal Technical Assistance	Supports priority one tasks 2.41, 2.42, 2.5, 2.8, and 2.11 in part.

Species	Action Priority #	Action #	Action Description	Action Status	Est. Initiation Date	Est. Completion Date	Responsible Parties	Work Type	Labor Type	Action Comments
Comal Springs riffle beetle (<i>Heterelmis comalensis</i>), San Marcos gambusia (<i>Gambusia georgei</i>), Peck's cave amphipod (<i>Stygobromus</i> (=Stygonectes) pecki), Fountain darter (<i>Etheostoma fonticola</i>), Comal Springs dryopid beetle (<i>Stygoparnus comalensis</i>), Texas wild-rice (<i>Zizania texana</i>), Texas blind salamander (<i>Typhlomolge rathbuni</i>), San Marcos salamander (<i>Eurycea nana</i>)	1	3.2	Monitor threats	Ongoing Current	FY 1995 - FY 1999		U.S. Geological Survey, U.S. Environmental Protection Agency, Texas Parks and Wildlife Department, Edwards Aquifer Authority, Edwards Underground Water District, City of New Braunfels (including New Braunfels Utilities, in some cases), Nongovernmental Organizations, Texas Natural Resource Conservation Commission, City of San Marcos, San Marcos National Fish Hatchery and Technology Center, Ecological Services	Research: Habitat Status	Internal Field Assistance, Internal Technical Assistance	Supports same priority one tasks noted for task 3.1 above. Part of basic mission for many agencies.
Comal Springs riffle beetle (<i>Heterelmis comalensis</i>), San Marcos gambusia (<i>Gambusia georgei</i>), Peck's cave amphipod (<i>Stygobromus</i> (=Stygonectes) pecki), Fountain darter (<i>Etheostoma fonticola</i>), Comal Springs dryopid beetle (<i>Stygoparnus comalensis</i>), Texas wild-rice (<i>Zizania texana</i>), Texas blind salamander (<i>Typhlomolge rathbuni</i>), San Marcos salamander (<i>Eurycea nana</i>)	1	4.1	Produce educational materials and inform a variety of audiences	Not Started			Texas Parks and Wildlife Department, Edwards Aquifer Authority, Edwards Underground Water District, City of New Braunfels (including New Braunfels Utilities, in some cases), City of San Antonio, City of San Marcos, Others, Ecological Services	Work type not yet selected	Labor type not yet selected	Supports priority one tasks 2.11, and subtasks 2.11, 2.41, and 2.42.

Species	Action Priority #	Action #	Action Description	Action Status	Est. Initiation Date	Est. Completion Date	Responsible Parties	Work Type	Labor Type	Action Comments
Comal Springs riffle beetle (<i>Heterelmis comalensis</i>), San Marcos gambusia (<i>Gambusia georgei</i>), Peck's cave amphipod (<i>Stygobromus</i> (= <i>Stygonectes</i>) <i>pecki</i>), Fountain darter (<i>Etheostoma fonticola</i>), Comal Springs dryopid beetle (<i>Stygoparnus comalensis</i>), Texas wild-rice (<i>Zizania texana</i>), Texas blind salamander (<i>Typhlomolge rathbuni</i>), San Marcos salamander (<i>Eurycea nana</i>)	2	4.2	Encourage public participation in conservation efforts	Not Started			Texas Parks and Wildlife Department, Edwards Underground Water District , City of New Braunfels (including New Braunfels Utilities, in some cases) , Southwest Texas State University , City of San Marcos, Ecological Services	Work type not yet selected	Labor type not yet selected	Uses support from task 4.1.